BERLIN SANDERS

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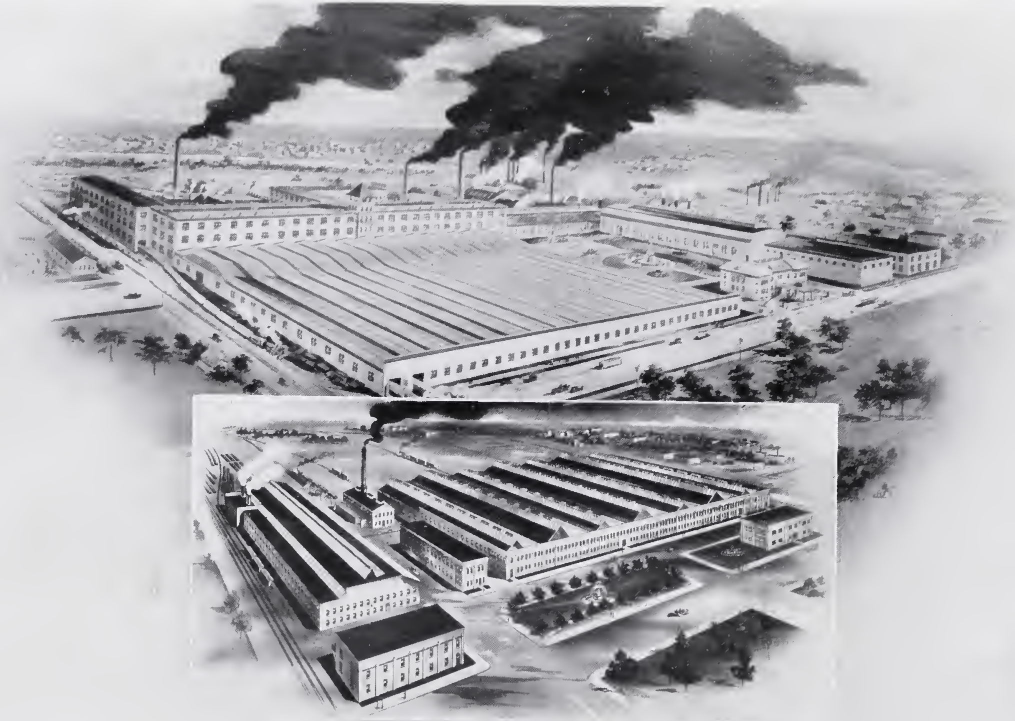
Berlin
Sanders

The SEAL of Quality *The SEAL of* Quality

THE BERLIN MACHINE WORKS
BELOIT WIS ·· HAMILTON CAN



The Berlin Machine Works of Beloit, Wisconsin, U. S. A.,
and Hamilton, Ontario, Canada

FOREWORD

THE building of Berlin Sanders has been going on uninterruptedly, since the first machine was built and used in a Berlin, Wisconsin factory, a third of a century ago.

Since that first little machine was completed Berlin leadership in sander design and construction has been maintained unquestioned. That is due to the aggressive and progressive policies of the Berlin organization in studying the requirements of the sanding operations in hundreds of factories where conditions differ widely.

The original Roll Feed Sander built at Berlin Wisconsin furnished the principle followed ever since in the construction of roll feed sanders. From time to time, however, the study of sanding problems by Berlin Engineers and the suggestions made by sander users has resulted in great improvements in the design and construction of the machine. These improvements have cost thousands of dollars, but the amount of money they saved is almost incalculable.

Notwithstanding the high standard of perfection attained in building Berlin Roll Feed Sanders, on account of the method of feeding stock to be sanded on this machine, it gives greater satisfaction, because it is more efficient, on some kinds of work than on others. It is particularly well adapted to sanding large surfaces and the largest proportionate return upon an investment in a Roll Feed Sander, is made when its work is largely confined to average large pieces.

There appeared, then, the economic necessity of bringing out a sanding machine especially adapted to and highly efficient in sanding the great quantities of short and narrow stock used in building furniture and in other lines of woodworking where sanding is required. This necessity brought out the very efficient small stock sander, using the Endless travelling bed principle with which to do the feeding. This principle has been worked out admirably, and as a result, many factories sand as much small short stock in one hour on the Berlin Endless Bed Sander as formerly required three to five hours with a Roll Feed machine.

The Endless Bed Sander has not, however, displaced the older machine, nor is it likely to, as is readily seen upon analyzing the kinds of stock to be sanded in the average woodworking plant. Commonly it is found that the combination of the two types of sanders is the ideal equipment. In the average factory the quantity of

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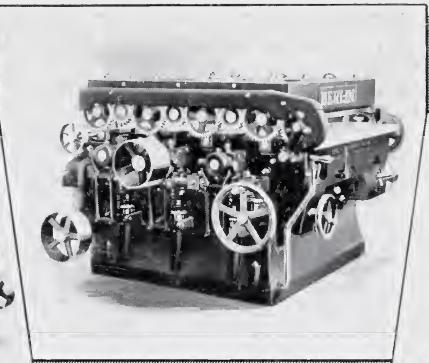
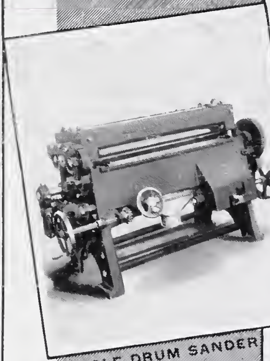
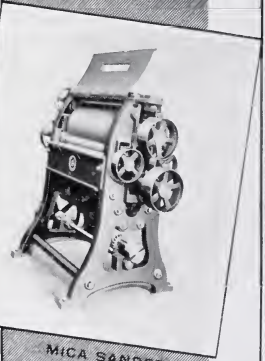
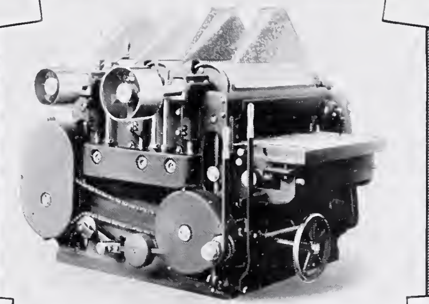
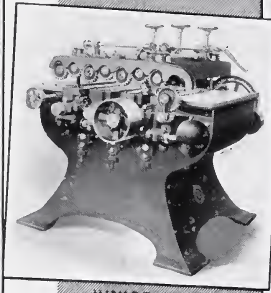
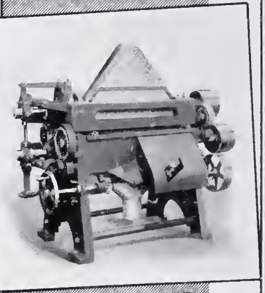

THREE DRUM ROLL FEED SANDER

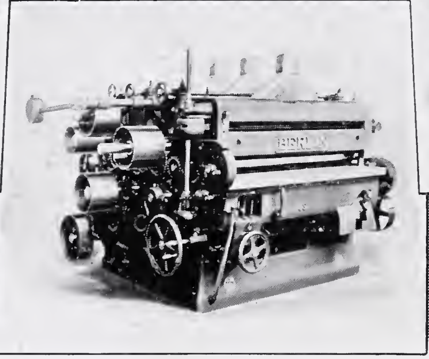

SINGLE DRUM SANDER


MICA SANDER


THREE DRUM ENDLESS BED SANDER


JUNIOR SANDER


BOX BOARD SANDER


SIX DRUM ROLL FEED SANDER

GREATEST SANDER LINE

small size stock is far greater than that of large stock, but it is quite necessary to have the small pieces for assembling in sufficient quantity to keep the assemblers in work. In order to keep conditions efficiently in hand it is required that the sanding equipment be capable of turning out several times more small parts than large pieces. This calls for the Endless Bed Sander.

The cheapest, most efficient system, then, is to employ both Roll Feed and Endless Bed Sanders. Send to the former all pieces of larger than average surface, together with all parts not exposed in the finished piece that don't require the most careful sanding. The latter may very well be run at the fastest feed furnished. And give to the Endless Bed Sander the small, narrow and short pieces for which it is especially designed. This combined Sander equipment provides the means of keeping sanding cost to the lowest possible minimum.

Where there is only enough work to keep one sander fairly busy, it is wisest, of course to choose the sander best adapted to the average work to be done.

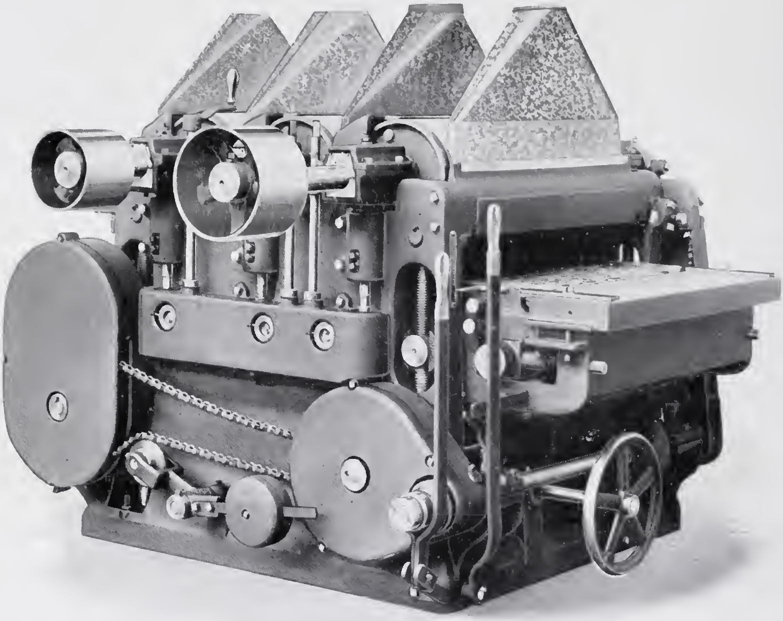
On the following pages are described several other types of Berlin Sanders machines mostly for special work. Notably there is the double surface sander with three drums below the three above adapted especially to sash and door sanding. There are also the Mica Sander for manufacturers of electrical specialties, the Box Board Sander for box makers, the Junior Sander for the concern that has only a nominal amount of sanding to be done. This latter machine with two or three drums is in special favor in schools with Manual Training woodworking departments.

So the reader will find a Berlin Sander adapted to sanding most economically any flat surface stock in shop or factory, large or small.

All Berlin Sanders are simple in design and easy of operation, and the materials and workmanship employed are at all times of the very best obtainable. It is the aim of the Berlin organization always to maintain the high standards of quality originally adopted and it is our sincere belief that we have done so.

Select any Berlin Sander and you will have the utmost assurance that that machine is highly qualified for the work it was designed to perform.

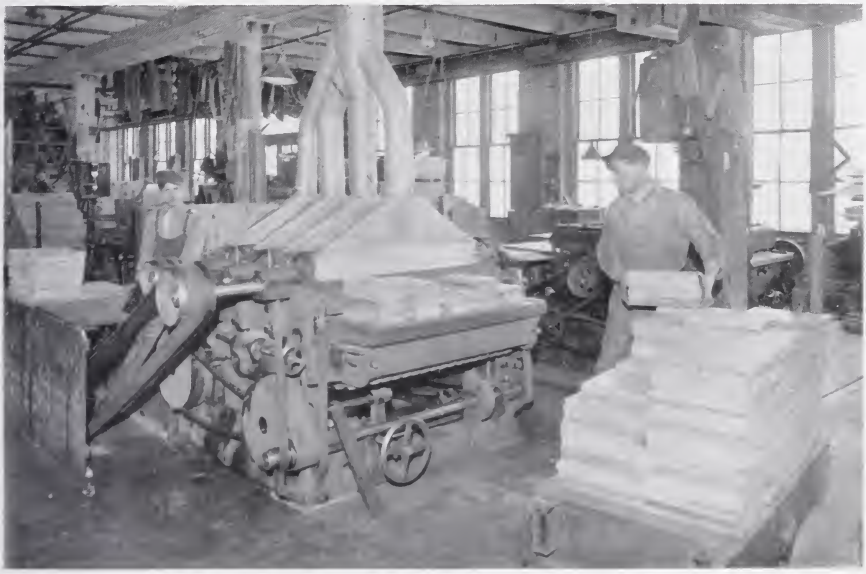
It is because Berlin Sanders have slways given unequaled satisfaction that the Berlin Machine Works are the Worlds largest Sander builders.



Berlin Endless Bed Sander
(*Triple Drum*)

In furniture and kindred lines of woodworking, the Berlin Endless Bed Sander has been found to be far more economical than the better known Roll Feed Sander on the general run of stock used. It has its greatest advantage over the Roll Feed Type on comparatively narrow and short stock, or on any small work, on which it insures a much greater output than a Roll Feed Sander is capable of and at the same time gives equally as fine finish.

The machine can be used to its utmost capacity on stock as short as 5 inches. On account of this fact it has eliminated quantities of hand sanding in many plants. Then too, with the use of forms as shown on page 9, stock even shorter than three inches can be sanded on the Berlin Endless Bed Sander, even though it be odd shaped and have delicate projections as on scrolls and like patterns.



Uses of Berlin Endless Bed Sander

The illustrations on this page and the two pages following, give an idea of the work on which the Berlin Endless Bed Sander is used to best advantage; but an idea of the many different kinds of work most profitably sanded on this machine is all we can hope to give here.

Notice the working of the hopper feed principle in the illustration above. This feature especially appeals to concerns whose product requires quantities of short stock. The operator piles stock across the entire width of the infeeding table, the piles resting partly on the table, partly on the moving bed. The bed feeds each succeeding bottom piece into the machine. Thus the full capacity is secured and yet all stock is sanded finely and uniformly.

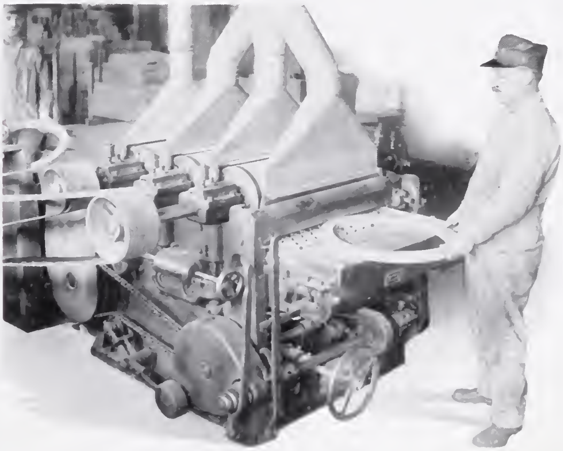
The lower illustration shows the Endless

Bed Sander used to good advantage on long narrow stock. In the furniture factory where this sander is installed they are able to sand their stock in half the time formerly required on a Roll Feed Sander, and all stock leaving the Endless Bed Machine goes into the finishing department without the necessity of hand or belt sanding.

Chair factories find the Endless Bed Sander an especially valuable machine. The cut opposite shows an Endless Bed working on stretcher stock, one inch square. That stock is sanded on this machine in about one-quarter of the time necessary to sand it on the Roll Feed type of sander. In the same factory the Endless Bed machine has eliminated considerable hand sanding on such stock as short rails not long enough to feed through the older Roll Feed type of sander.

The versatility of the Endless Bed Sander as compared with the Roll Feed machine is really remarkable. The lower picture shows a common use made of the Endless Bed machine, that is, sanding stock on edge. No trouble is experienced even when the ends are curved as in the illustration. Note the capacity of the machine on this work and the finish secured is just as fine and uniform as on flatwork.

With a Berlin Endless Bed Sander you are always able to get the full use of the entire width of the sandpaper whatever kind of stock is being run, and while the same result can be secured on large work on a Roll Feed Sander, yet to attempt to utilize the entire width of the



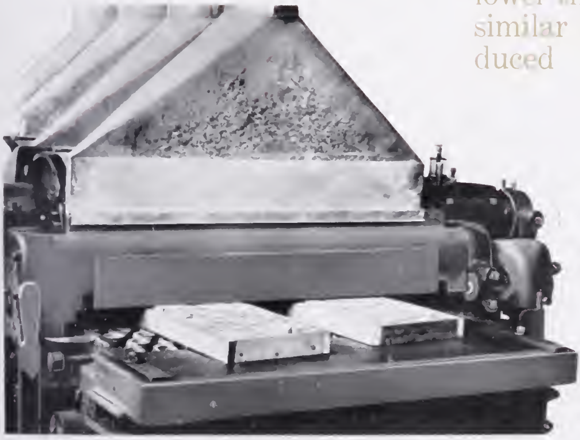
machine on the smaller work presents difficulties with which the user of any Roll Feed Sander is thoroughly familiar.

The upper illustration shows a circular chair seat being fed into the Endless Bed Sander. The rubber faced bed carried it through smoothly and steadily. The slight resiliency of the bed eliminates danger of accident or damage to stock.

The Endless Bed Sander is also valuable in sanding veneered stock, as that work when sanded on this machine is attended with less danger of sanding through the veneer and spoiling the work, than is the case when sanded by other methods.

The lower illustration shows two forms each containing over 30 pieces. They were both sanded in less than half a minute. The pieces in these forms are irregular in shape, as can be seen, yet not the slightest difficulty was encountered in their sanding.

Manufacturers of small articles, such as kindergarten specialties, draftsman's triangles and curves, with their fine points and delicate scrolls, have found in the Berlin Endless Bed Sander, the one way to lower their cost of sanding. Many similar cases of sanding cost reduced with the Endless Bed Sander have come to our attention.



A Toy manufacturing firm has found the Berlin Endless Sander a valuable addition to its equipment because of the ability of this machine to finish-sand small articles at a very low cost.

General Construction

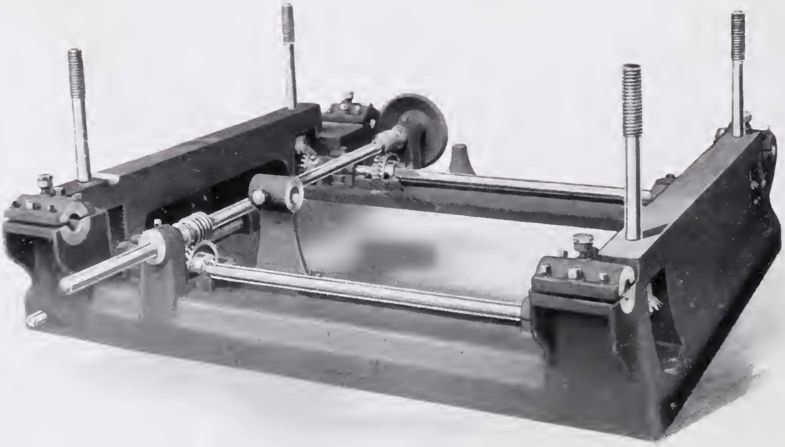
(Endless Bed Sander)

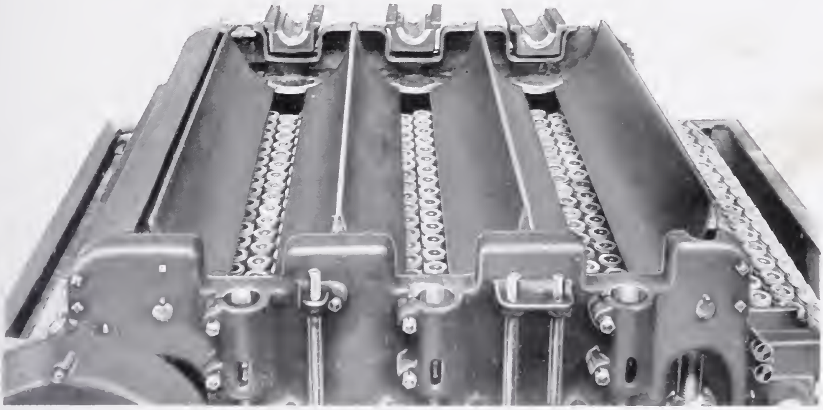
The chief distinction between the Berlin Endless Bed Sander and the better known Roll Feed type is that the work on the former is fed through the machine on an endless rubber faced bed, and the sand drums are over the work.

The bed frame is carried on four screw posts working through swivel nuts near each corner of the machine. These screw posts are operated by mitre gears at the bottom, cross shafts connecting the opposite sides. The longer lever at the left front corner of the machine controls the power adjustment of the bed, for different thicknesses of stock. A large hand wheel at operators position accomplishes the same result by hand.

The screw posts supporting the bed, are carried directly on the base, resting there on a *counter-sunk phosphor bronze step*. The base itself, as shown below, is of the engine bed type, cast in one piece. The side frames are securely bolted to the base and are rigidly braced, top and bottom.

The triangular girts between the drums, which act on this machine as the platen, are cast in one piece, as shown in the picture on the opposite page.





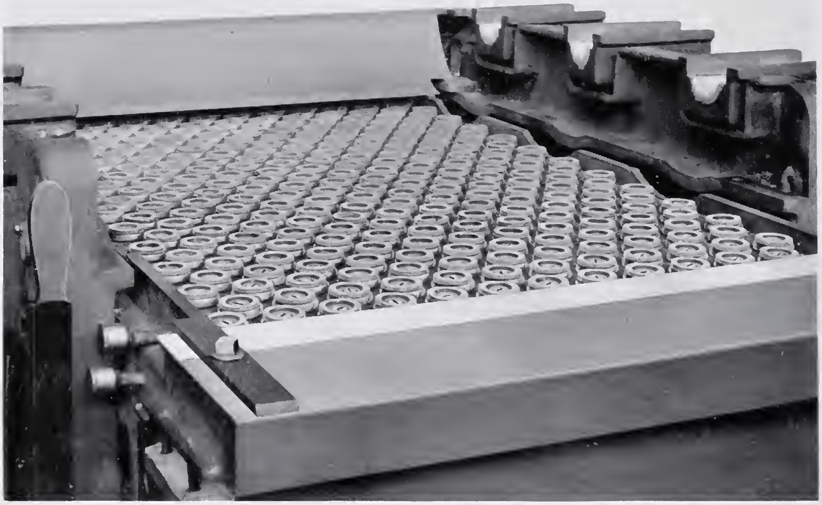
Top View Triangular Girt-Platens

The platen of the Endless Bed Sander follows closely the construction perfected in building the well-known Berlin Roll Feed Sander, only the platen is *inverted* on account of the drums being *above* the work on the Endless Bed Sander, instead of *below* as on the Roll Feed Sander.

The Endless Bed is driven by a roller bearing chain from the front to the rear of the machine and then through powerful gear reduction to the sprocket shaft. The chain is always in a horizontal position and permits of raising or lowering the bed without the use of expansion links. The feed is controlled by the short lever at the left front corner of the machine. This lever operates an expansion friction clutch, permitting feed to be started or stopped instantly.

Individual dust hoods that fit closely up to the drums are provided, allowing no dust to accumulate and interfere with good work. All drum bearings are of our new Automatic Take-up type and insure perfect adjustment at all times. A stop oscillator permits the first drum to be run without oscillation whenever desired.

The Berlin Endless Bed Sander may be equipped with either the well-known patented Spiral drum or the Berlin Improved Straight-Opening Automatic Take-up Drums. The two types of drums mentioned are illustrated and described on pages 42 to 45.

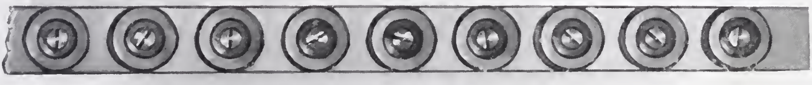


Endless Bed Feed Works

Stock to be sanded on the Berlin Endless Bed Sander is carried under the sand drums on the rubber faced endless traveling bed shown above, which revolves around a solid one piece frame.

No feed rolls are needed on the Endless Bed Sander, as the adhesiveness of the rubbers furnishes more than sufficient feeding power to carry any stock, large enough to reach two of the circular rubbers, through the machine, without the slightest hitch or bother. The elimination of feed rolls does away with all adjustments connected therewith, making the Endless Bed Sander more simple of operation than any Roll Feed type machine.

One of the discs which form the base of the bed is here shown, actual size. The lower part of this disc is a pressed steel cup slightly conical in shape. Into this cup fits a one piece circular rubber $1\frac{3}{4}$ inches in diameter and hollowing in the center to receive a flat washer. A countersunk head screw passes down through the

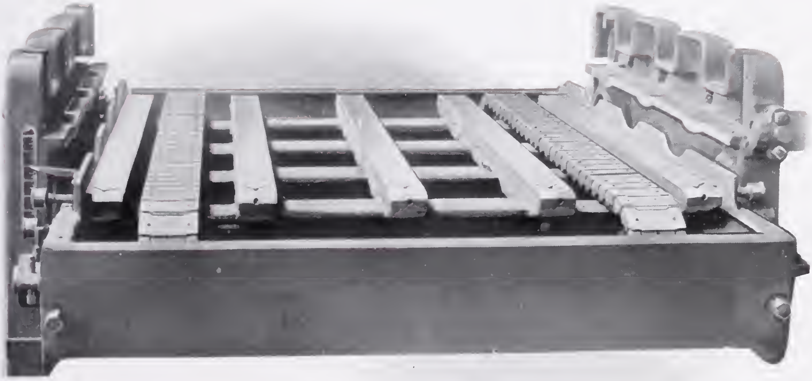


washer, rubber and cup into one of the steel slats, 1⅞ inches wide, that form the foundation of the bed.

When feeding stock, vacuum created between the top of the washer and the top of this circular rubber has a suction effect and holds the stock firmly when carried under the sanding drums. This adds to the positive feeding power of the Berlin Bed—eliminates danger of stock slipping, as often happens where a solid faced rubber section is used. Then too, slight resiliency of the Berlin circular hollowed rubbers permits of using the entire width of the bed even though the stock fed is of slightly varying thickness.

A section of one of the steel slats with discs attached is shown above. The slats ride on planed ways demountable from the bed frame. These ways, as well as the two endless chains of hinged links to which the steel slats are fastened are shown in the lower cut. This part of the Endless Bed construction is more fully illustrated and described on pages 18 and 19.

The Berlin Bed travels like a ribbon around the ends of the bed frame without the least tendency to buckle or raise up the slat at the turn. This is shown in the cut on page 18, where the infeeding table is removed.



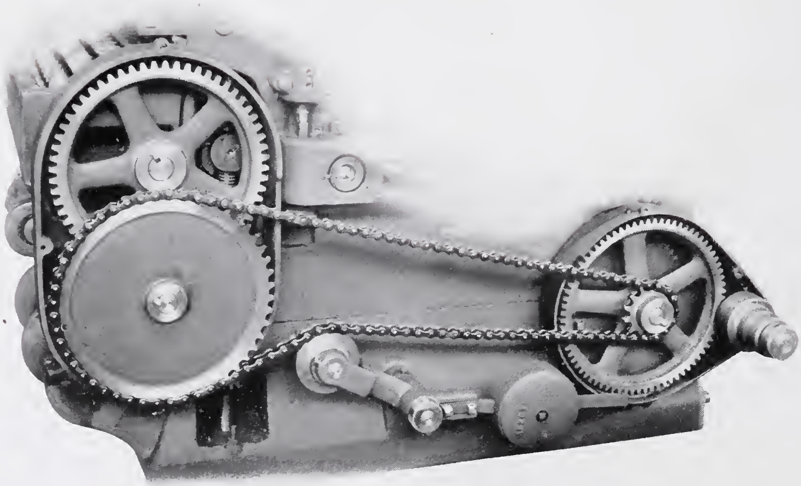
Chain and Belt Feed Drive

The drive for the feed of the Berlin Endless Bed Sander is from the countershaft to the driven shaft at the rear of the machine, and from this shaft by means of a belt to a secondary shaft at the front of the machine. The drive through reduction gears and a chain from the secondary shaft to the shaft that drives the endless bed is shown below very clearly.

It will be noticed that instead of using a train of gears from the front to the rear of the machine, we employ the much efficient roller bearing chain drive, driven by machine cut sprockets.

This drive is positive and yet it provides protection against injury to the machine, when the bed is moved up too closely to the sanding drums to freely admit stock. When an attempt is made to feed stock too thick to readily enter the opening provided, the belt driving the secondary shaft on the machine slips, stopping the feed.

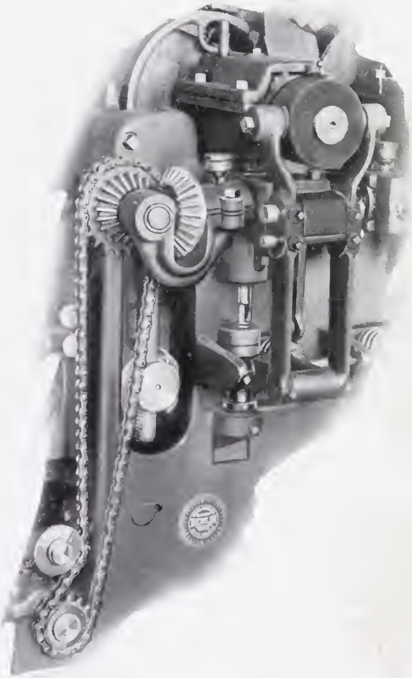
The shaft at the rear of the machine with its pulleys is shown on page 18.



Oscillators

"The oscillating parts are better controlled than on any other sander we have seen and give complete satisfaction" is the way one Berlin Sander user speaks of these parts in a letter.

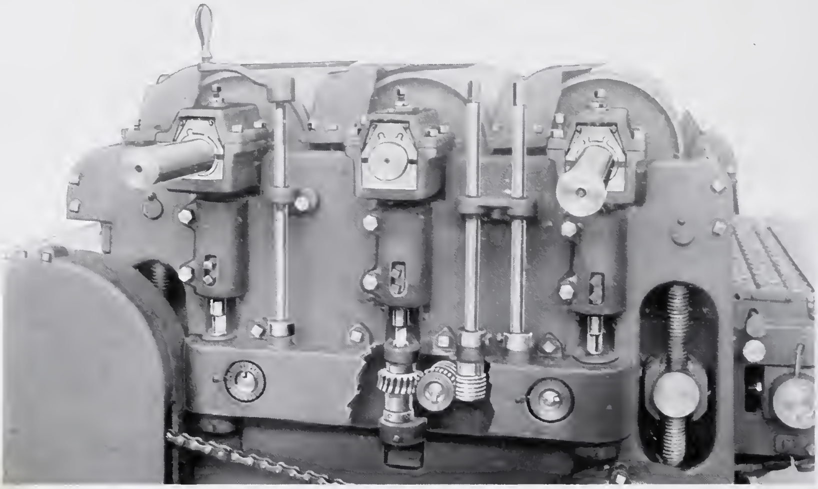
Berlin oscillators are of the link type having a direct pull from the center of the cylinder. All three drums of the Berlin Endless Bed Sander are equipped with oscillators, but a stop oscillator is provided for the first drum, so that that drum may be run with or without oscillating, as desired.



The oscillator drive is by means of a roller bearing chain from a sprocket on the jack shaft to a combination sprocket-bevel-gear which connects with a bevel gear on the eccentric shaft. This insures a powerful and steady drive. A tightener takes up any slack in the chain.

Berlin oscillator bearings are durable and wear-resisting and means are provided for quickly taking up wear as it occurs. They have stood the strain of years of service without giving trouble. The oscillator chain drive, and one of the oscillator bearings, as well as a section of one of the automatic take-up bearings for the drum journals are shown in the cut on this page. For detailed construction of the oscillator bearings, please refer to cut and description on page 32.

The eccentric shaft bearings are of an improved type of construction and make it easy for the operator to take up wear by simply loosening a nut and turning a set screw.



Micrometer Drum Adjustment

The drum journal boxes of the Berlin Endless Bed Sander are cast with long heavy shanks that fit into split sockets in the side frame. The sockets are provided with clamping screws so that the fit of the shank in the socket is made perfect and vibration is prevented.

The illustration above shows the sockets spoken of and the squared portion of the screws, below the socket. Near the lower end of the socket are shown two set screw heads. In aligning or levelling the drums these two set screws are loosened, a wrench applied to the squared portion of the screw and the drum is raised or lowered as required for levelling. The set screws are then tightened, of course.

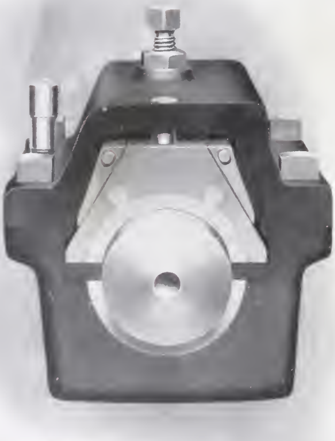
The three upright squared end shafts, seen in the illustration, control the adjustment of the drums for the cut desired. The hand crank is on the adjusting shaft for the third drum; it is used however as desired on all three shafts. This does away with handwheels on each separate shaft, which would at times interfere with easy access to the drum journal bearings and the drum themselves. The adjustment of the drums is of micrometer accuracy, and the dials shown in the illustration register adjustments made in 1-1000 of an inch. The detailed construction of the drum adjusting mechanism is shown where the guard is broken away.

Automatic Take-up Bearings

Perfectly adjusted bearings for the drum journals are a big aid in securing the finest, most uniform sanding.

The drum journals of the Berlin Endless Bed Sander run in our patented Automatic Take-up Boxes. This type of box has proven wonderfully successful on the high speed journals of our fast feed machines, and is equally successful on the Endless Bed Sander.

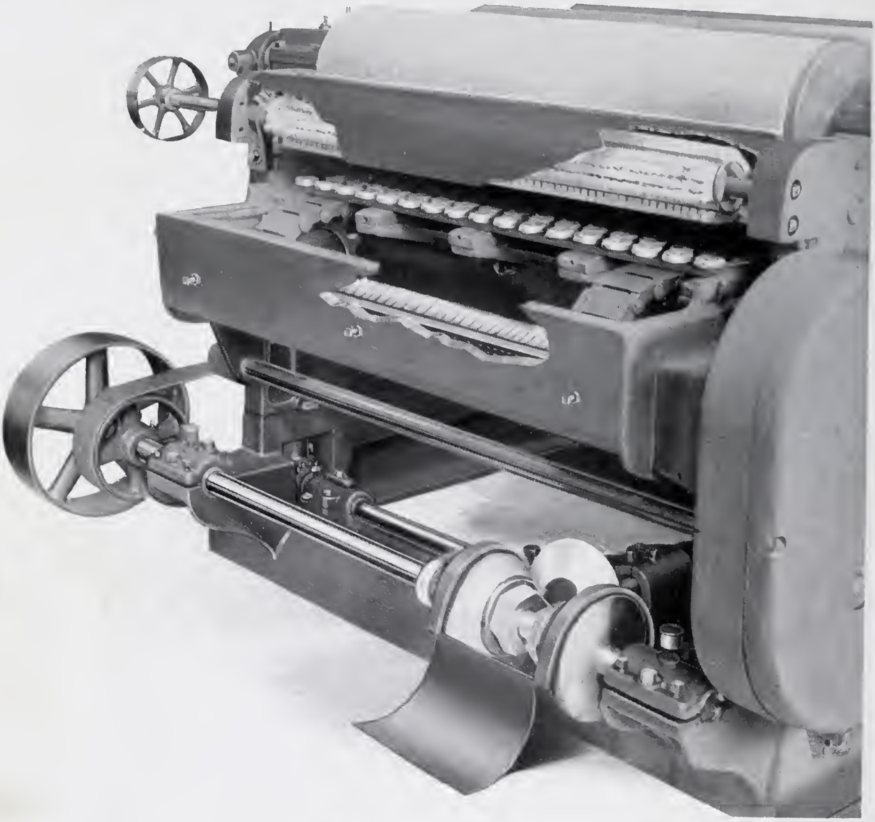
Unlike the old style box with the rigidity clamped cap, the Berlin Automatic Take-up Box has a loose cap: that is loose in the sense that it is always free to follow the journal to provide a perfect bearing. With the natural wear of the bearing, this cap settles with the journal, following it absolutely. Springs keep the cap snugly upon the journal its entire length, never too tight to cause heating, never too loose to allow pounding.



The sides of the cap are tapered. Tapered bronze wedges lie between the cap and the sides of the box. As the cap settles, the wedges follow it wedging in between it and the sides of the box. The wedges are kept in place, as they follow the cap down, by flat springs at each end, on top. The cap is not forced down, but is held down. It will not become too tight. It cannot get loose. Hence there is always a perfect bearing.

This feature is greatly appreciated by operators as it relieves them from the worry caused by loose bearings. It also guards against neglect to keep the bearings tight, a necessity in securing the best possible finish on the stock and avoiding the necessity of frequent repairs.

The only attention this Automatic Take-up Bearing requires of the operator, is oiling—bearing troubles are forgotten.



Stock and Bed are Brushed Clean

Notice the revolving brush at the outfeed end of the machine, where the guard is broken away, in the picture above. This brush cleans the stock as it leaves the Berlin Endless Bed Sander. It is driven from the middle drum shaft, Lower, where the bed casting is cut away, is a section of a stationary brush which cleans the bed as it travels around removing any grit or dust.

In the bottom part of the picture notice the bevel frictions for hoisting the bed by power. A convenient lever at the infeeding end of the machine controls the power hoist. Also notice a section of the driving belt which travels horizontally from the rear to the front of the machine.

Certain points of bed construction and operation shown above are described on the opposite page.

Bed and Bed Foundation

In the picture on the opposite page, taken from the outfeeding end of the Berlin Endless Bed Sander, the slats at the ends of the ways upon which the bed travels and the outfeeding table are removed to show the bed foundation, a section of chains of hinged links to which slats are attached and sprockets around which chains travel.

The endless bed slats ride on planed ways demountable from the bed frame on which they are supported. It is easy to remove them and true them up should they ever need it. On the 31-inch machine we use four planed ways for the bed to travel on and on the 43-inch and 49-inch machines, five ways. Efficient means of oiling these ways is provided, so as to do away with excessive wear and provide perfect lubrication. You will notice the ends of the five ways on a 43-inch machines in the picture—three in the center and one at each end.

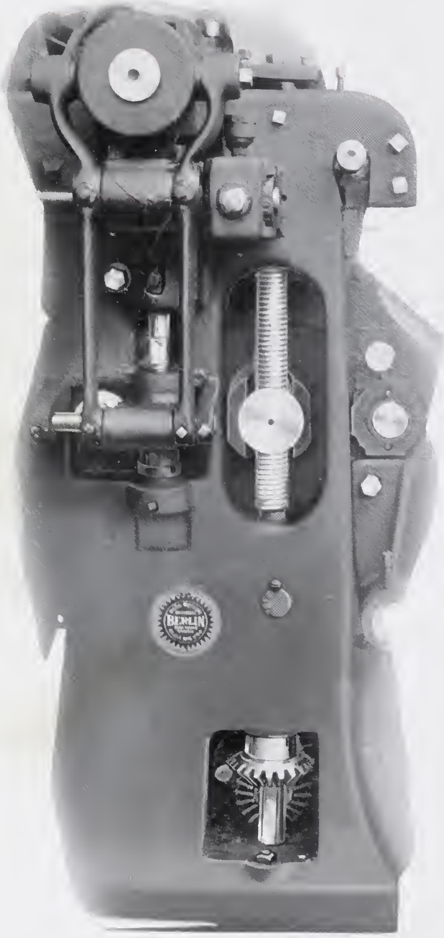
The hinged links, shown in the illustration are milled where the slats fasten on and also where they come in contact with the milled sprockets that drive the bed. Thus the slats have a perfect seating on the links, and the links a perfect bearing on the sprockets in going over.

The pins in the hinged links are ½ inch in diameter, having a bearing 2 3-16 inches long in the center where the wear comes. These pins are placed two inches from center to center and the steel slats are 1⅞ inches wide, the hinges coming between the slats so that as the bed winds around the sprocket wheel the slats do not raise up and drop away from the lumber kicking up at front or back edge, but run around smoothly. As has been said, the bed of the Berlin Endless Bed Sander travels like a ribbon around the ends of the bed frame.

Bed Adjustment

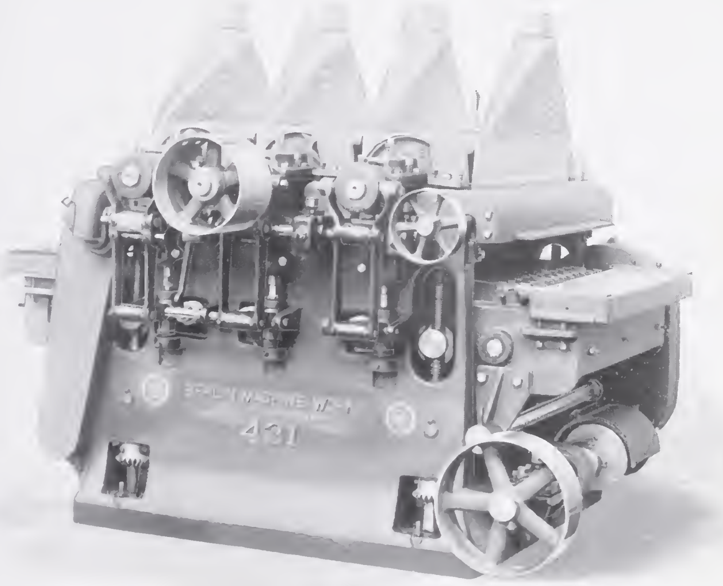
The one piece frame around which the traveling bed revolves is mounted on four heavy screw posts which have bearings at the top and near the bottom.

The lower ends of the four posts extend to the base of the machine where they rest upon countersunk phosphor bronze steps.



In the sides of the bed casting and near the four corners of the machine are four swivel nuts through which the four posts pass in raising or lowering the sander bed for thickness of stock. The screw posts are operated by means of mitred gears, at the bottom, cross shafts connecting the two opposite at each side of the machine, to provide for equal adjustment—the cut opposite shows one of the four screw posts with bevel gears below and swivel nut above.

Near the center of the cross shafts and connecting with them by means of worms and worm gears is another shaft running from the front to the rear of the machine operated by bevel frictions at the rear, and a hand wheel at the machine front. This shaft connecting and controlling the bed adjustment shafts insure that both sides of the bed are raised precisely alike. The friction is used for the power hoist, the hand wheel for the hand adjustment. The power adjustment of the bed is controlled by the longer lever shown in the cut of machine on page 6. It acts so easily and accurately that the hand adjustment is seldom necessary except in making a very close adjustment.



Berlin Endless Bed Sander—Rear View

Independent Dust Hoods

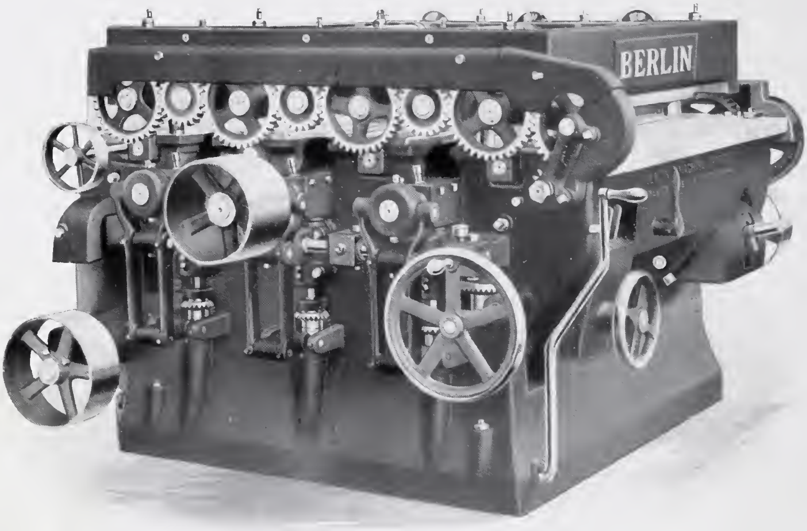
As shown in the cut above the independent hood method of dust collection is used on Berlin Endless Bed Sanders. This method removes the dust quickly and efficiently so that the finish on the stock is not affected on account of dust filling up the grit of the paper or laying on the surface of the work.

Then, as an extra precaution to insure that the quality of work produced on the Berlin Endless Bed Sander shall be the finest, a revolving brush at the outfeeding end cleans the stock, while a stationary brush cleans every rubber of the bed at each revolution. Sections of these two brushes are shown in the cut on page 18.

It will be noticed that a hood is provided for the revolving brush at the rear as well as for each of the three drums. The hood over the brush may not be absolutely needed, and it may be easily removed in such cases.

To make sure that the Berlin Endless Bed Sander shall continue to be the best for its purpose, we have studied and perfected the machine not only in the large features but also in the smaller details. These details have their effect, directly or indirectly, on the finish given the stock.

BERLIN SANDERS



Berlin Triple Drum Sander
(*Roll Feed*)

The cut above shows the most modern Triple Drum Roll Feed Sander.

From the time the first Triple Drum Roll Feed Sander was built at Berlin, Wisconsin over a third of a century ago, up to the present time, Berlin Engineers have redesigned and rebuilt the Triple Drum Roll Feed Sander several times. Our idea has always been to have the Berlin Sander embody the best design and the best devices discovered or invented up to the time changes were made. The machine shown above embodies, we believe, the best things in sander construction discovered or invented up to the present time.

Notice especially the compactness of the machine and the solidity of its construction—it is built to give the same good service, after years of use, as when first installed.

Uses of Berlin Triple Drum Sander

(Roll Feed)

For many years Triple Drum Roll Feed Sanders of Berlin manufacture have given universal satisfaction in by far the greater number of woodworking plants where power feed drum sanders are used. The machine gives the required finish on all stock but has the greatest capacity on long, wide stock.

In sanding different kinds of stock on the Berlin Roll Feed Sander you are assured of the largest output that a Roll Feed Sander can give because of the many operating conveniences provided. For instance, your operator can instantly adapt the speed of feed to the finish required by simply moving a small hand lever. Stock requiring the very finest finish can be run at a slow rate of feed, other stock not requiring so fine a finish can be run at a much faster rate of feed.

Many woodworking plants with large quantities of stock to sand varying in size from very small to large pieces use a Berlin Roll Feed Sander in combination with the newer type Endless Bed Sander. That is the ideal sanding equipment—the latter machine sands the small and medium sized work, while the former sands the large work, and those pieces that, on account of not requiring the finest finish, may be run at the fastest feeds furnished.

General Construction and Operating Devices

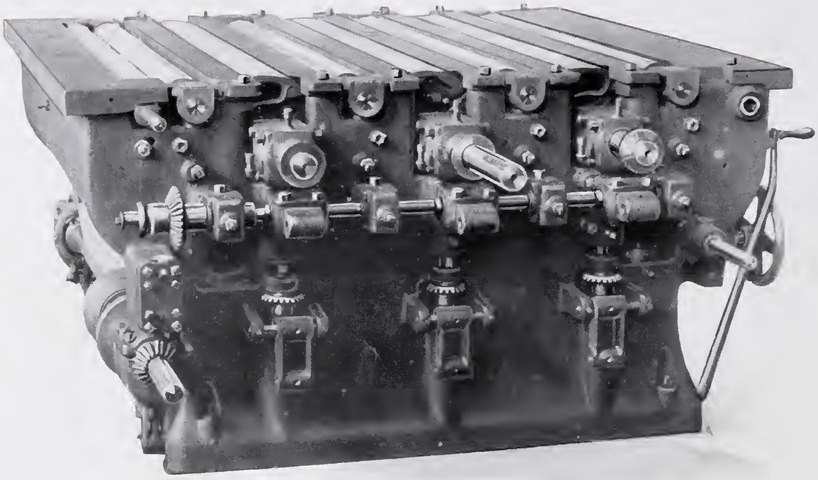
(Roll Feed Sanders)

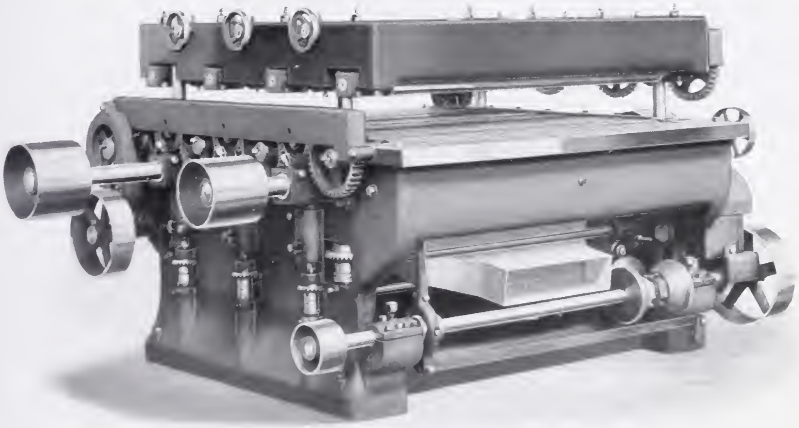
Because they are designed with a view to making it as easy for the ordinary operator to secure good work as poor work, is one reason why Berlin Sanders have held the favor of sander users ever since the first Sander was built. They are simple in design. The best workmanship is employed throughout and the best materials obtainable are used.

Berlin Sanders are heavy where strength is needed. The base is cast in one piece and is of the engine bed type, which gives an unusually solid foundation. The side frames are bolted solidly to the base and braced by girts and the bed plates. The plates themselves are cast in pairs to prevent any spring that might occur in sanding heavy stock.

The top frame which carries the pressure rolls and upper driven rolls is built in the same substantial manner as the lower part of the machine. It is supported by four heavy steel posts. A long lever at the left corner controls the power hoist for the top frame, a large hand wheel accomplishes the same result by hand.

The Six Drum Sander shown on page 26 is similar in construction to the triple drum but carries six drums instead of three. It has an especially heavy and well constructed top frame due to the fact that three of the drums are carried above. Four extra posts are used to take care of the added weight. The frame is braced, not only at the ends but by plates between the drums and by cast iron braces across the top. No pressure rolls are needed because the three top drums serve that additional purpose.





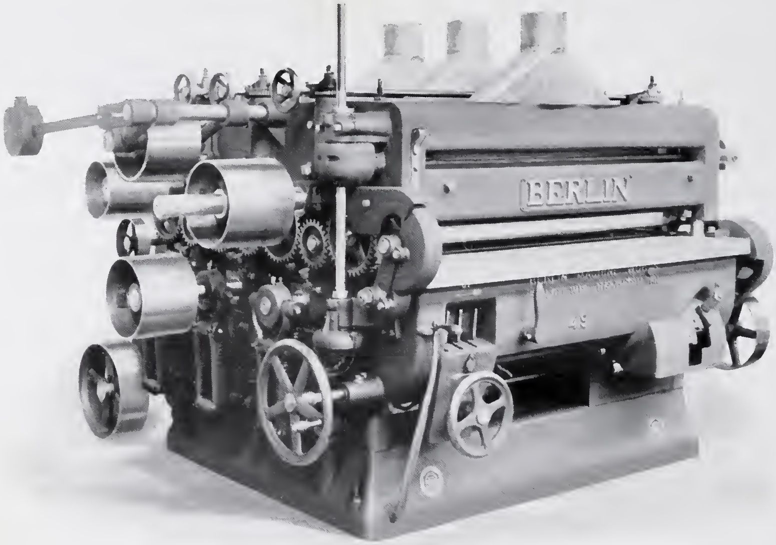
Berlin Triple Drum Roll Feed Sander—Rear View

At the right corner of the Berlin Triple Drum as well as the Six-Drum Sander, is a lever providing a means to start, stop and obtain three rates of feed instantly. A short lever pointing upward just below the infeeding table allows of starting, stopping, or reversing the feed. At the left corner of the machine just below the infeed table is a hand wheel which controls the drum adjustments, independent of one another, or all three simultaneously. After a drum adjustment is made by the convenient and improved Berlin method, it is automatically locked in place so that there can be no *give* to the adjustment.

The new enclosed type oscillators used are a vast improvement over any of the old style. This feature is shown and described on page 32. On the Six Drum Machine the Oscillator drive is transmitted from the lower oscillator shaft to the top oscillator shaft by a vertical shaft upon which a beveled gear is feather keyed. Very heavy bearings are provided for the oscillator shaft to eliminate vibration.

Either the patented Spiral Drum or our improved Automatic Take-up Drum can be furnished on the Triple Drum Roll Feed Sander. The Six Drum Sander is built for the use of Spiral Drums only. Experience of hundreds of sander users furnishes the most convincing proof of the superiority of Berlin Drums.

The two types of drums mentioned above are illustrated and described on pages 42 to 45.



Berlin Six Drum Sander
(Roll Feed)

This machine is designed to sand two sides at one operation, to provide as large capacity on double surface stock as the triple drum has on sanding stock one side. It is, in general construction, practically like the triple drum machine, with three top drums added. It has all the improvements and convenient operating devices of the Berlin Triple Drum Roll Feed Sander.

The bed platens are heavy and heavily reinforced and all other parts correspond with the provision made here for the rigidity which is necessary for good sanding. The top frame is carried on four two inch hoisting screws and four two inch guide posts. These supports afford ample brace and strength for the top section and keep out vibration. The top may be raised and lowered by means of either the power hoist arrangement or by hand, as on the triple drum machine. A special belt tightener makes necessary the use of but two belts for the top three drums.

The dust collectors for the top three drums are sectional similar to those illustrated and described on page 21. The dust pan for the lower drums is the same as described on page 37.

When ordered, we can furnish a sliding clutch on the upper oscillator jack shaft by which the oscillators may be thrown in or out, as desired. This arrangement enables you to change the Six-Drum into a Three-Drum whenever desired.

The patented Spiral Drum only is furnished—see illustrations and descriptions on pages 42 and 43.

Uses of Berlin Six Drum Sander

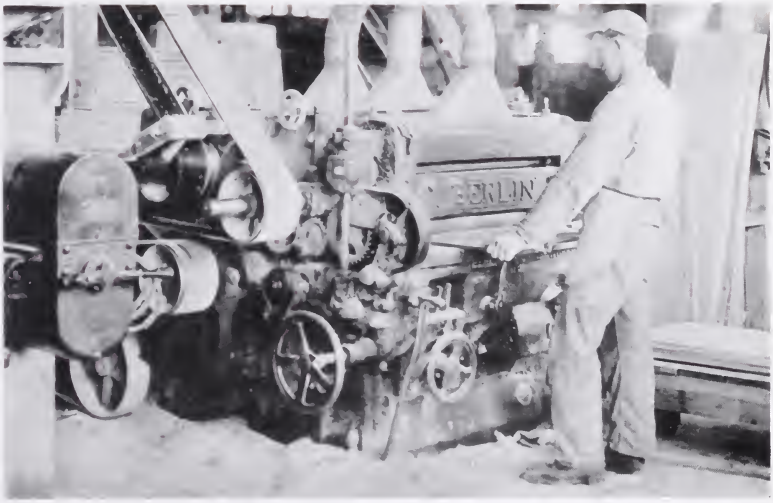
This machine is being used in the largest sash and door plants in the world. On doors the usual capacity of the Six Drum machine is from 1000 to 1200 sanded both sides in ten hours.

As a panel sander or for sanding veneers this machine cannot be excelled. The adjustment of the machine is so fine that thin stock may be handled readily and uniform results secured.

On a single machine, the drums cut opposite a press roll, while on the Six-Drum the top and bottom drums work opposite to each other. This not only sizes the stock, but polishes it more uniformly. On single sanders working in tandem, unless the stock is absolutely uniform, and the rolls of the second sander set to a nicety, there is considerable danger of uneven sizing. This possibility is eliminated on the Six-Drum.

Usually the Six Drum Sander will take care of the work of two Three Drum Sanders, at the same labor cost required to operate one Three Drum machine.

The economy of floor-space shown there is a decided advantage. A Six-Drum occupies the same floor space as a triple drum sander exactly. Where floor-space is at a premium, this saving is greatly appreciated. Seldom can you increase capacity without increasing floor-space. After the saving in labor and floor-space, the increase in capacity and quality of work comes the power saving. Careful tests show a saving of ten to fifteen H.P. in the running of one Six-Drum over two three-drum Sanders. In many plants, this saving would be worth while.



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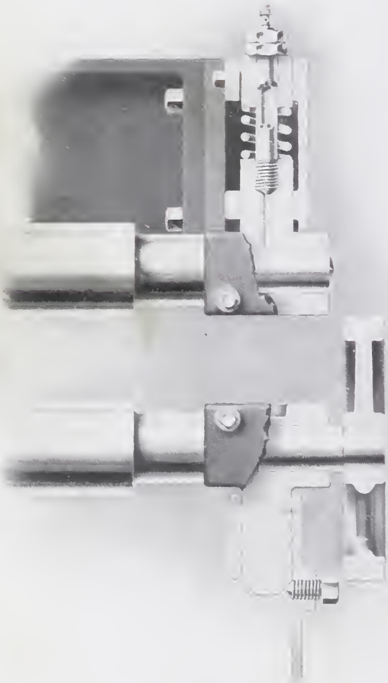
Feed Roll Adjustment

Each of the eight solid feed rolls are $3\frac{3}{8}$ inches in diameter. They are turned and ground to micrometer accuracy in insure perfect face and perfect work.

The illustration shows the section of an upper and a lower feed roll, the construction of upper and lower feed roll boxes, as well as the means of independent adjustment of both rolls. The upper feed rolls may be raised or lowered for alignment by first loosening the set screw on the inside of the top frame on each plug and dropping or raising rolls to the desired position. For very slight adjustment of the feed rolls it is necessary only to tighten or loosen the two nuts on top of the plugs shown in the top cut and spoken of above.



The above features allow of leveling the rolls without changing the tension of the springs, and may be accomplished quickly on the new Berlin Sander. When the proper adjustment is obtained, the roll is securely held in position by the set screw.

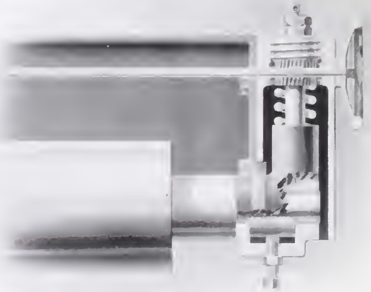
To adjust the bottom rolls, it is only necessary to loosen a cap screw at the side, which holds the roll in position, and raise or lower the box by means of the set screws at the bottom.

The bearings or boxes are of the improved "White" type, which do away with all shims or gibs, and provide a simple and effective take-up. The journals are heavy, $1\frac{5}{8}$ inches in diameter by $4\frac{1}{2}$ inches in length, and the entire bearing may be quickly removed by loosening two screws.

Pressure Roll Adjustment

The adjustment of the pressure rolls as well as their alignment is a most important feature in the operation of a roll feed sander. Good work depends very largely upon proper adjustment and practically perfect alignment.

With this in mind, we have made a decided improvement in the construction of the pressure roll bearings and in the means of adjusting and aligning the rolls themselves. The rolls are adjusted for pressure on stock by means of the hand wheel shown in the cut. When only a slight raising or lowering of the roll is required for perfect alignment, it is necessary only to disengage the worm, on the handwheel shaft, from the worm gear on the plug shown, and applying a spanner wrench, which we furnish, to the top of plug, turning to the right to raise roll to the left to lower it. To disengage the worm from its worm gear, loosen the set screw on the hand wheel, pull the handwheel out to the end of the shaft and screw the worm in towards the machine, until it is free from the worm gear. This disengages both sides at once, so that alignment may proceed from either or both ends.



When the pressure roll is considerably out of alignment, which seldom happens, loosen the set screw on the inside of the top frame, which tightens on the plug and align with straight edges on the machine bed.

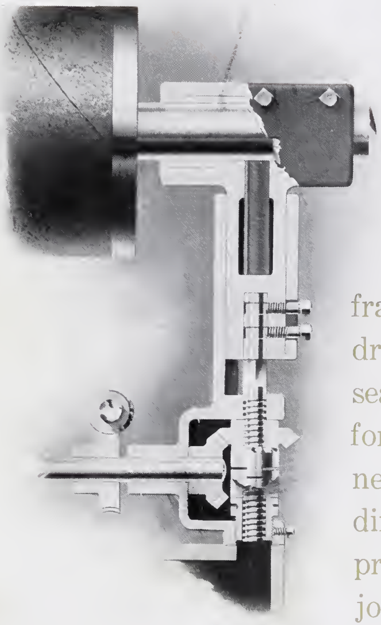
The coil spring which engages the under side of this collar and the top of the roll box gives tension to the pressure rolls, and acts as an automatic take-up for any wear on the thread of the adjusting screw. The pressure rolls of the Berlin Triple Drum Roll Feed Sander are three in number, and are turned perfectly smooth to 5 inches in diameter.

As the pressure of the pressure roll journal is always upwards, there comes the necessity of adjusting the lower half of the bearing. This is accomplished by means of the set screw with a lock nut shown holding up the lower half of the bearing.

Cylinder Hoist Screw

One of the essential points in the securing of fine uniform sanding, is that the drums run true and without vibration.

To insure that, Berlin engineers gave the cylinder bearings and hoist screw of the Berlin Sander a direct bearing on the heavy cast-in-one-piece base, putting no strain whatever on the frame.



The cylinder journal bearings are of the "White" type, considerably improved and made self-oiling. The boxes are cast with trunnions which are housed in openings cored in the side frame. The lower end of the trunnion is drilled to receive the screw upon which it seats and which provides the adjustment for levelling the cylinder whenever that is necessary. The adjusting screws seat directly upon the heavy base itself, thus providing a rigid seat for the drum journal bearings.

In levelling, simply loosen the two set screws shown extending through the trunnion housing and the trunnion itself and tightening upon the adjusting screw, and apply wrench to the squared portion of the screw. In this way that end of the cylinder can be adjusted either up or down in the most convenient and accurate manner. The screws are provided with a take-up nut with which any possible thread wear or end play is easily taken up.

There are no gibs or shims used in this construction. We would like to have you compare the simplicity and effectiveness of this device with that used on other machines.

Cylinder Adjustment

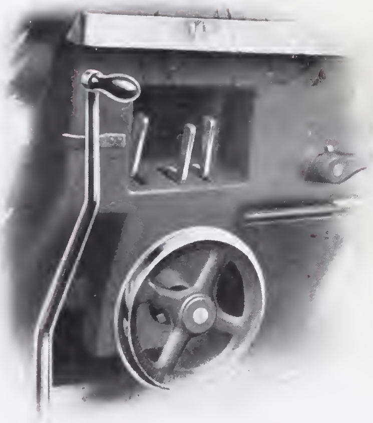
In the illustration below is shown the Berlin Method of quick and accurate cylinder adjustment. There is only one hand-wheel to operate instead of the usual three and three short levers shown furnishing the connection between hand wheel and each cylinder.

To rise or lower the first cylinder, it is necessary only to pull out the lever at the extreme left, thus throwing the clutch into gear. The correct movement of the handwheel then makes the adjustment desired.

An independent or simultaneous adjustment of the drums is made possible by this arrangement, as with all three levers pulled out, all three cylinders may be adjusted by one handwheel. On other machines it is impossible to obtain a simultaneous adjustment.

When all three levers are out, they are released by another small lever located at the right of the hand-wheel. When one lever is back, the movement of any other lever instantly releases it, automatically locking the cylinder in position.

The automatic cylinder locking device is another feature distinctive of the Berlin Sander.



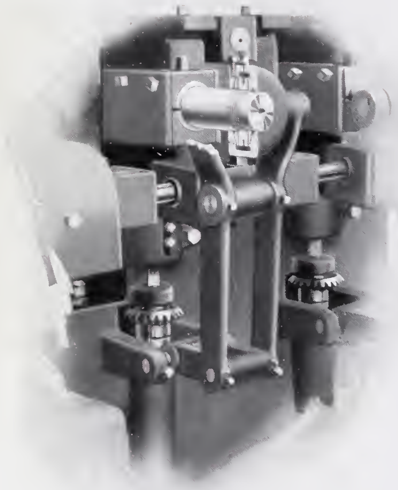
The cylinder adjusting hand wheel and levers are most conveniently located at the left side of the machine with stock entering at the operators right. This, together with the very convenient locating of the lever which starts, stops or reverses the feed gives the operator an advantage not obtainable with any other Roll feed Sander.

(Patent [illegible])

Oscillators

On account of the constant backward and forward motion to which they are subjected, probably no part of a Sander gets harder wear then the oscillators. This is especially noticable in the boxes.

The cross-sectional cut below shows the simple, strong and durable oscillator used on Berlin Sanders.



The oscillating device is of the link type and pulls directly in line with the cylinder shaft.

The oscilator box is cup-shaped, self-oiling and will retain all oil up to the under side of the shaft. The box is entirely enclosed and dust proof making it impossible for the oil to escape or dirt to reach the bearings. By loosening the set screws on the top inside edge of the box and applying a spanner wrench to the threaded collar, all wear or lost motion may be readily taken up.

The oscillator drive is direct from jack shaft to eccentric shaft by means of a short gear driven shaft, which permits of no slipping and sliding, as is the case where the belt is used. The eccentric shaft bearing supports are cast as a part of the side frame, making a rigid bearing for such work. They are of the improved White type, as are also the drum bearings.

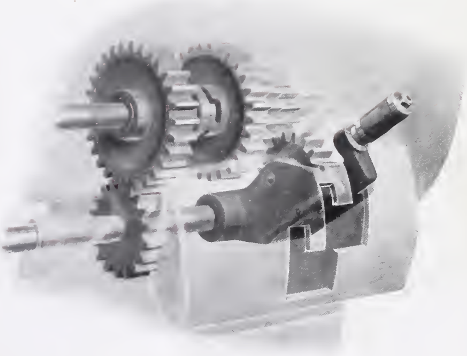
A stop oscillator may be provided for the drums when specified.

Quick Feed Changes

The most economical sanding requires that the operator be able to adapt the rate of feed to the kind and condition of stock being sanded and the grade of finish required.

The variable feed device provided on the Berlin Sander, enables the operator to change from a fast to a slow rate of feed or vice versa, by simply raising or lowering the lever shown in the skeleton picture below.

The lever is carried on a pinion mounted on the lower feed shaft. With the lever in position at its highest point, the driving pinion meshes with the smallest gear and the highest rate of feed is obtained. To reduce this speed it is necessary only to pull out the lever pin, drop the handle, and slide it into the next lower opening. The pin drops into a slot and the driving pinion meshes into the next smallest gear. The slowest speed is obtained with the lever in the lowest notch.



The Berlin quick feed change device is built like an automobile selective type transmission, only it is a great deal heavier. The three gears shown at the right top give three changes of feed, 12, 17 and 21 feet per minute, respectively. The one large gear at the left meshing into the smaller one below it permits of reversing the feed. The lever shown on the following page controls the reverse feed, and also furnishes a means of starting and stopping the feed.

We cannot lay too much stress on the ease and quickness with which the rate of feed can be changed on the Berlin Sander.

Reverse Feed

Accidents that often happened on the older Triple Drum Sanders, were carefully guarded against by our engineers in designing the modern Berlin Triple Drum Sander.

Many accidents to stock, drums and operator could have been prevented on the older machines had they been equipped with a convenient reverse feed device.

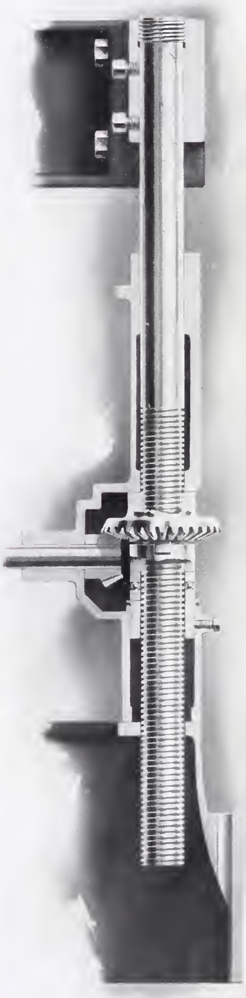
To raise the frame, when a board sticks in the machine, is dangerous, because stock will fly back with great force. Nor could this be done quickly enough to avoid trouble. But with our reverse feed the operator simply throws over the reverse lever and the stock comes back traversing the same path over which it entered at the regular rate of feed.

Sometimes before the operator can stop the feed, when he discovers something wrong, the paper will have broken. The immediate reversing of the feed however, will relieve the pressure. That will save the felts, while with a machine without a reverse feed, stock would be forced ahead causing damage to the drums that would probably lay up a machine for several hours.

The provision that has been made for the prevention of accidents is an important point to be taken into account in considering the installation of a sander, for accident prevention means less spoiled stock, avoidance of delays, lower upkeep cost, as well as safety for the operator.

Top Frame Hoist Screw

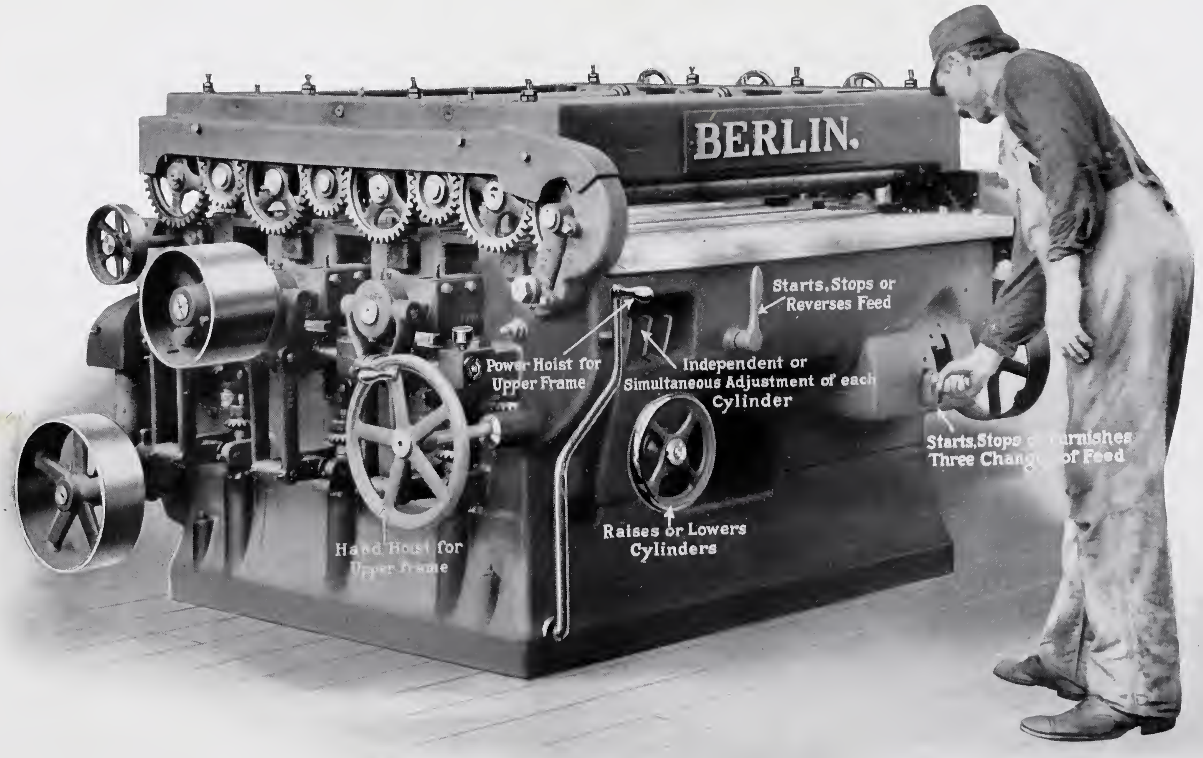
The picture at the right shows the rigidity of the top frame hoist screws. They are made of the best 2-inch crucible steel, and carry the top works without spring or vibration. Four screws, like that shown, support the top frame, which carries the pressure rolls and upper feed rolls.

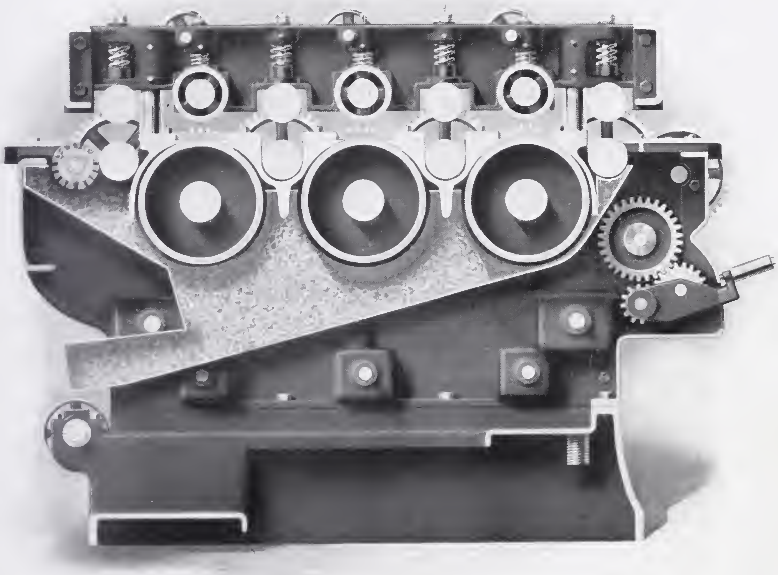


The posts are threaded at the lower end and provided with a take-up nut, with which any possible thread wear or end thrust of the nut may quickly be taken up. The top part of the screw is not threaded, and forms a guide for the upper frame.

At the top of the hoist screw is a threaded plug, which turned in or out, provides an independent adjustment of each corner of the top frame for the purpose of leveling. In the top of the plug is a screw-driver slot, which enables this levelling to be accomplished. If it is desired to remove the screws, simply remove the plug, and the screw will slide out without distrubing any other part of machine.

The bevel gears seen near the bottom of the screw, are connected with the power hoisting attachment. The lever which throws in the power hoist is located at the left front corner of the machine. Please refer to illustration on page 36.


BERLIN.
Starts, Stops or Reverses Feed
Power Hoist for Upper Frame
Independent or Simultaneous Adjustment of each Cylinder
Starts, Stops or Furnishes Three Changes of Feed
Raises or Lowers Cylinders
Hand Hoist for Upper Frame



Dust Pan

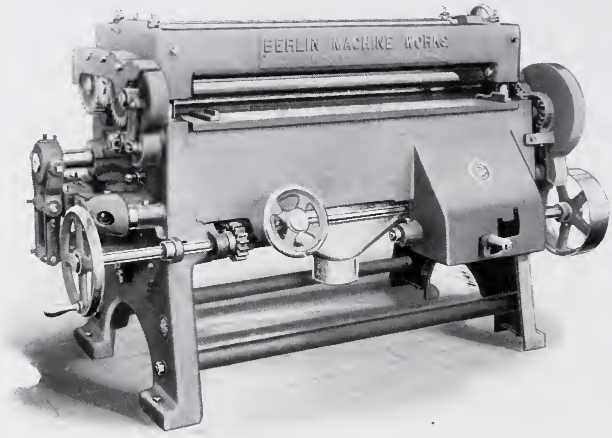
The dust pan of the Berlin Roll Feed Sander fits closely up to the drums, and takes in the outfeed rolls and the brush which cleans both stock and roll. The air inlets are only at drum and brush openings beside openings under the infeed and outfeed tables. This arrangement most effectively removes dust immediately it is made, and does away with the dust filled air in sanding rooms.

With exception of the drums, there is no mechanism inside the dust pan, and underneath the dust pan the frame is entirely open. Should anything get into the pan, it may be easily removed from the front opening.

A brush cylinder is provided for cleaning the stock as it leaves the machine; in addition it also cleans the last roll, a feature that is strongly appreciated by users. The brush is driven from the third drum shaft.

The results on finished stock prove that our idea of getting the dust away from the work at once is right for good sanding.

BERLIN SANDERS



Berlin No. 411 Single Drum Sander

An especially valuable machine for the small manufacturer is the No. 411 shown above. Where an extra fine finish is not required, stock can be fed into this sander direct from a small resaw and, with coarse paper on the drum, will be finished smoothly and uniformly. A finer finish of course, results from first planing stock, and then sanding with fine paper on the drum.

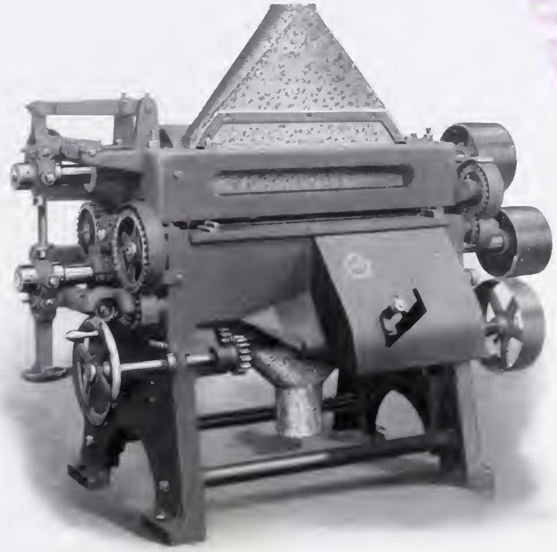
The No. 411 has several of the improvements embodied in our larger Roll Feed Sanders, such as Spiral Drums and Instantaneous Feed Change Device, permitting the operator to change from a slow to a fast rate of feed or vice versa, by simply throwing a lever. The drums are of the same diameter as used on the larger machines and oscillate in the same manner. Note that there are no parts projecting above the top frame to hinder passing stock over the machine.

The No. 411 will take stock up to $8\frac{1}{4}$ inches in thickness. Rate of feed are 12, 16 and 20 feed per minute.

This machine is built 30 and 42 inches wide.

BERLIN SANDERS

DISCONTIN



Berlin No. 115 Box Board Sander
(Double Surface)

On this machine small box stock, that requires a finer finish than is secured on the surfacers generally used in box factories, may be well sanded both sides at one operation. It is especially useful in factories where the finer boxes are made, such as boxes for surgical instruments, drugs, etc. as well as cigar boxes.

The upper frame of the machine is supported on the cast-in-one-piece base, by four heavy steel posts. It may be raised or lowered by means of the convenient hand wheel at the left side of the infeeding end. Four feed rolls are used. The upper infeeding roll is made of solid rubber with just enough yield to allow two or more pieces of slightly varying thickness to be fed. The rate of feed may be changed instantly by means of the Berlin variable speed device.

The well-known Berlin Spiral Drums are used. The upper frame being placed directly over the lower one insures a fine finish and uniform thickness. The machine is built 30" wide only and will take stock from less than one-quarter inch up to 8" in thickness.

Rates of feed 12, 16 and 20 feet per minute.

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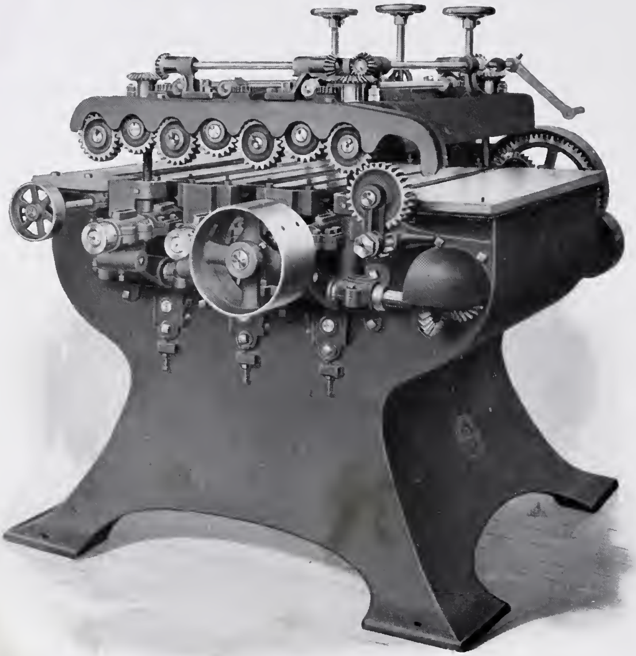
BERLIN SANDERS



Berlin Junior Sander

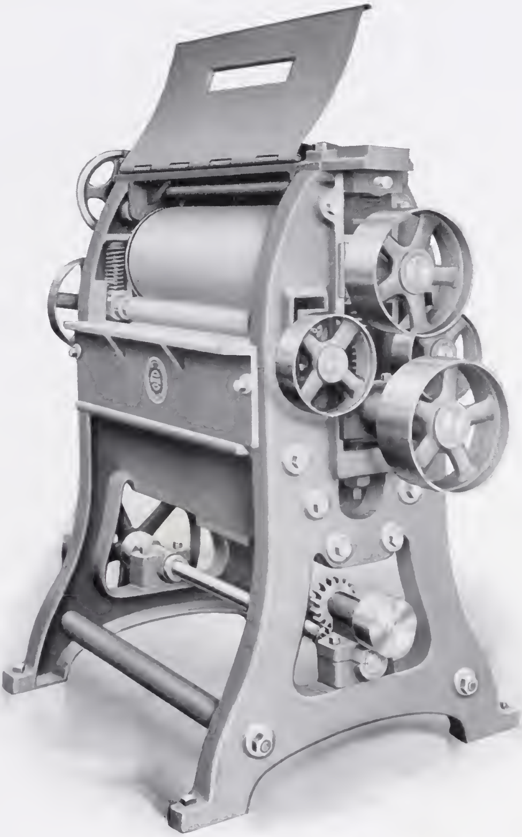
In small shops that have mostly small work, this machine is particularly desirable. As the machine carries three drums, three grades of paper may be used and a very fine finish secured.

The Junior Sander is very simple in construction. All adjustments are on the right hand side and easily accessible crank shown raises and lowers the top which is supported at the corners of the machine by posts set in double brass bushings. The upright handwheels on the long shaft provide the drum adjustments, while smaller hand wheels on the side of the frame give the feed roll and pressure roll adjustments.

The drums are of the improved Straight Opening type, 8 inches in diameter, and will stand quite a heavy cut. The end adjustments for alignment are simple and easily made. Equally as fine and uniform work can be secured on stock from 1-16 inch up to $3\frac{1}{2}$ inches in thickness. The machine is built with two or three drums and in two widths, 18 and 24 inches.

Rate of feed $12\frac{1}{2}$ feet per minute.

BERLIN SANDERS



Berlin No. 426 Mica Sander

The Berlin No. 426 Mica Sander is the only machine of its type built. It is almost indispensible to Mica Specialty Concerns, Electrical Supply Manufacturers, or in any line where mica it to be sized from the rough.

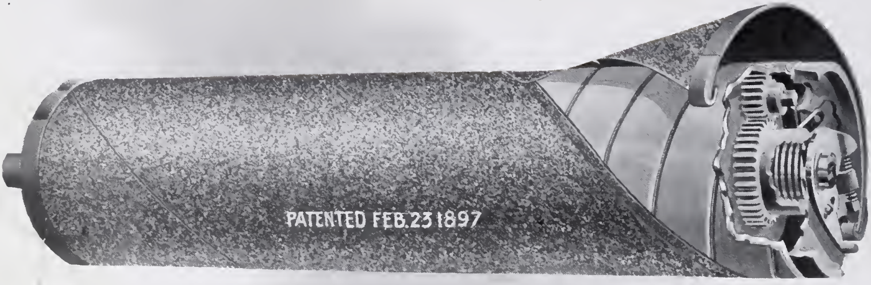
The machine will take stock from 1-64 inch to 9-16 inch in thickness, and finishes both sides at one operation. It is equipped with the patented Spiral Drum illustrated and fully described on pages 42—43 as this type of drum is particularly well adapted to mica sanding. No felts are used on the Spiral Drum on the Mica Sander.

The top feed rolls are of rubber, gripping the stock firmly and feeding it positively, at the same time taking care of slight variations in thickness. The lower rolls are of solid steel.

The Mica Sander is built in two widths, 24 inches and 30 inches.

Rate of feed 28 feet per minute.

The Berlin Patented Spiral Drum



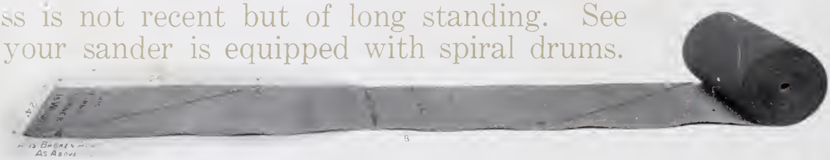
The name of this drum comes from the method of applying the sand paper spirally about the drum from end to end, as is illustrated in the above plate, to provide a continuous cutting surface.

The paper is held to a clutch at either end by means of a steel band, and tightened in a spiral manner by screwing the clutches at the ends of the drum in opposite directions. There are no working parts inside the drum. The mechanism for tightening the paper is shown on this and the next page in the top plates.

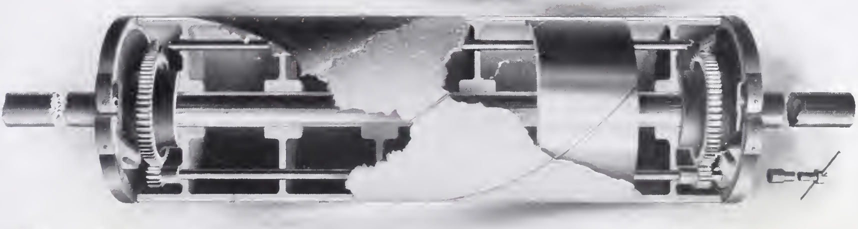
The clutches form the ends of the drum, and the clutch hub screws into the hub of the large gear shown. By means of the T wrench the clutch is turned and moved away from the drum proper. Thus the spiral wrapping is continued and at the same time the spiral pulled endwise tightening the paper absolutely on the drum.

The plate below shows how the paper is cut diagonally and the sharp end broken away for insertion on the clutch. In applying the sandpaper, the paper end is inserted in the clutch opening, the end of the steel band hooked on its pin, and the paper wound around the drum, the end of the first band is hooked in place when the first revolution of the drum is completed. When the paper is wound to the end of the drum the second steel band is hooked in place, circled about the clutch and fastened as was the first end band. The two end bands are now fastened tightly by means of the screw which forces the dog against the clutch, and finally the paper is tightened spirally by screwing the clutch out with a T wrench, applied to squared end shaft shown in both top cuts.

The Berlin Spiral Drum is the only continuous cutting drum obtainable. It is simple and efficient, therefore successful and its success is not recent but of long standing. See that your sander is equipped with spiral drums.

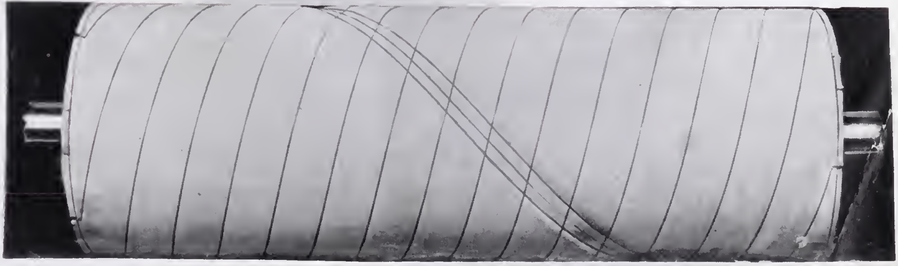


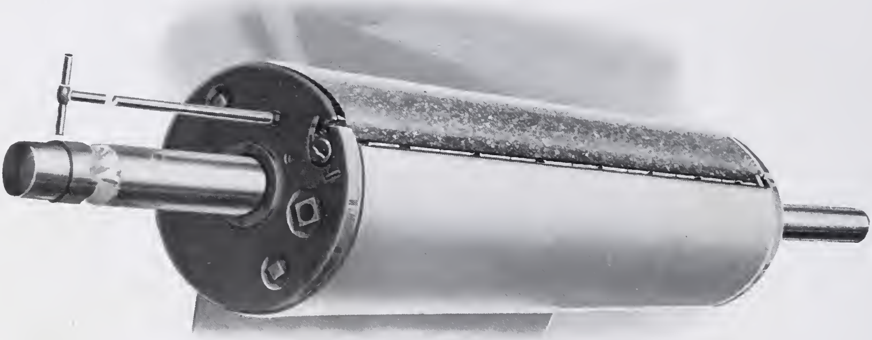
Covering the Spiral Drum



The above plate illustrates the construction of the Spiral Drum. The frame proper is a series of cast cylinders each 6 inches wide, except the end sections which are 6¾ inches wide, and a steel shaft. These sections are first turned on the inside as well as on the face. The number of sections required for any desired length of drum are then locked together and a spiral groove is milled about the face of the drum. This groove is made just deep enough to allow the sandpaper to lap there and make a perfectly smooth sanding surface. Each section is then balanced independently and hydraulically pressed onto a steel shaft. The cylinder is now turned to size and a small spiral groove is cut in the opposite direction to the large milled groove, the length of the drum, to receive the wire that holds on the drum covering. The drum as a whole is now very carefully balanced. After taking a fine finishing cut from the drum, it is again balanced perfectly, and the drum is ready for its covering of felt which forms a cushion for the sand paper.

The first drum—the one that carries the course sandpaper—is covered with one thickness of heavy white felt. The second and third drums have an extra covering of thin felt to make them more resilient. The felt is cut the same shape as the sandpaper, and bound to the cylinder by wires. First, the edges of the felt, which meet in the large spiral groove, are wired. Then a wire is wound in the small groove, which (as explained above) runs in the opposite direction to the large one. This forms a perfect cushion, just yielding enough to insure a firm cutting surface.





Berlin Improved Automatic Take-Up Drum
(*Straight Opening*)

Because experience has proven that the Spiral Drum gives the best results wherever the very finest and most uniform finish is desired, we regularly equip Berlin Sanders with the Spiral Drum—the drum with the continuous cutting surface.

In some instances however, the Straight-Opening type of drum is found to meet individual requirements better than the Spiral. For that reason we also make the Improved Straight-Opening Drum with Automatic Take-Up Device shown on this page and the one following. Wherever a Straight-Opening Drum is preferred, the Berlin Straight-Opening Drum is unquestionably the simplest and most improved drum of this type.

The drum is made up of sections hydraulically pressed on a shaft. There is no mechanism inside which cannot be reached from either end of the cylinder. All parts of the paper clamp and Automatic Take-up are both easily and quickly removed. Each edge of the paper is secured separately with a self-adjusting fastener. This is an entirely new device and adjusts and evenly tightens the paper automatically while the operator is clamping same.

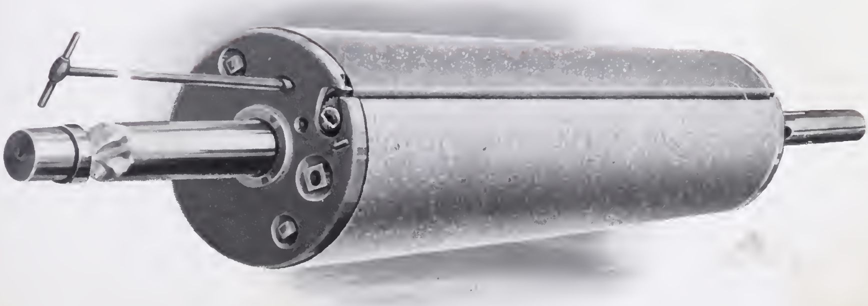
One great advantage of the Berlin Straight-Opening type drum is that the Automatic Take-up device is sectional, whereas other drums of this type have one solid rod across the drum to clamp the paper and act as a straining device to take up any slack that tends to accumulate after the drum has been running, the Berlin has a clip every two inches to clamp the paper and heavy springs every two inches to act on the take-up.

The drum with one long rod will get all the strain on the ends and the center has a tendency to "bag" whereas the Berlin will take up the paper evenly all along because of its flexible sectional take-up device. This sectional device is shown in the cut on the preceeding page. 36-inch paper is used entirely.

The felt on the Berlin Straight Opening Drum is covered by a heavy canvas put on with the felt giving the drum a smooth wear-resisting surface, and eliminating nearly all danger of tearing the felt. On the first drum of a Berlin Triple Drum Sander equipped with Straight-Opening Drums, there is one felt and one canvas. On the second drum two felts and one canvas, while the third has three felts and one canvas.

The illustration below shows the Berlin Straight-Opening Drum with the paper applied. Compare the opening required where the paper is clamped with that of any other drum of this type. You will immediately notice that the opening on the Berlin is smaller, so that this drum has a greater cutting surface than other drums of the Straight-Opening type. It takes no more paper to cover the Berlin but more of the paper is utilized. This fact taken together with our sectional automatic take-up device means economy of sandpaper and better finished stock.

Paper can be applied to the Berlin Straight-Opening Automatic Take-up Drum in three minutes. Should it ever require it, a drum can be covered with felt and canvas in half an hour.



Berlin Improved Automatic Take-Up Drum

Specifications and Sizes

The Berlin Roll Feed Sander is built with 31″–37″–43″–49″–55″–61″–67″–73″–85″ and 103″ drums. It will be noticed that these drum lengths are 1-inch wider than sanding drums are generally made. This gives clearance for the full width of stock. Straight Opening Automatic Drums are furnished on order only for the following widths on the Roll Feed Sander: 31″–37″–43″–49″.

The opening of the roll feed is 8″. On special order 12-inch opening may be supplied.

On machines 31″ to 43″ wide inclusive, the tight and loose pulleys are size 12x10½ inches; 49″ to 61″ machines T. & L. pulleys are 14x10½ inches; 67 and 73 inch machines have 16x10½ inch pulley and machines 85 and 103 inches wide have pulleys 16x12½ inches.

A countershaft, with all necessary pulleys and hangers is furnished with each machine.

The Berlin Endless Bed Sander is built with drums 31″–43″ and 49″ wide. Stock 6 inches thick as a maximum may be run.

Tight and loose pulleys for the 31 and 43 inch machines are 12x10½, for the 49 inch machine, 14x10½ inches.

A countershaft with all necessary pulleys and hangers is furnished with each machine.

The Berlin Six Drum Sander is built 31″ and 49″ wide. The regular opening is 8 inches. Tight and loose pulleys for the 31 inch machine are 12x10½ inches; for the 49 inch machine, 14x10½ inches.

All pieces and parts of every machine are stamped with symbols, so in case duplicates are wanted, accurate ordering by wire or letter is an easy matter. Give the figures and letters that make up the symbol. That is all we require.

Tested Berlin Sanders Ready to Ship.

BERLIN SANDERS

Code Words

THE BERLIN SANDER. *Roll Feed.*

Toss	31″	wide
Tosse	37″	“
Tosem	43″	“
Tosel	49″	“
Toser	55″	“
Toset	61″	“
Tosey	67″	“
Tosor	73″	“
Tosum	85″	“
Tosop	103″	“

BERLIN ENDLESS BED SANDER

End	31″	wide
Ender	43″	“
Endes	49″	“

SIX DRUM BERLIN SANDER. *Spiral Drums Only.*

Tundar	31″	wide
Tundam	49″	“

JUNIOR SANDER-TWO DRUM. *S. O. Drums Only.*

Tragedy	18″	wide
Tragic	24″	“

JUNIOR SANDER-THREE DRUM. *S. O. Drums Only*

Traitor	18″	wide
Tramp	24″	“

SINGLE DRUM BERLIN SANDER. *Spiral Drums Only*

Tortella	30″	wide
Tortellam	42″	“

BOX BOARD SANDER. *Spiral Drums Only.*

Tundat	30″	wide

Mica Sander

Tranto	24″	wide
Tranty	30″	“